

CLAIMS

What is claimed is:

1. A device for dispensing a liquid comprising:

a. a valve body having a liquid chamber including a lower chamber
5 opening, and a liquid passage extending through the valve body to the chamber,

b. a valve assembly including a valve seat forming a sealing relationship
with the lower chamber opening, the valve seat having a dispensing orifice, and a
valve stem extending vertically through the chamber and operative to open and
close the dispensing orifice; and

c. a replaceable filter assembly disposed in the liquid chamber around
the valve stem, the filter assembly positioned between the liquid passage and the
valve seat so that liquid entering the device must pass through the filter assembly
before the liquid is dispensed.

2. The device of claim 1 wherein:

a. the filter assembly comprises a cylindrical filter element having a
15 bottom portion in a sealing engagement with an upper portion of the valve seat; and

b. the liquid input passage extends away from the chamber through the
valve body to provide a radial flow of the liquid into the filter element.

3. The device of claim 2, the filter assembly further comprising a filter support
20 internal to the filter element.

4. The device of claim 3 wherein the filter support comprises a spring.

5. The device of claim 4 further comprising a liquid sealing element positioned within the valve body proximate an upper portion of the filter element.

6. The device of claim 5, the filter assembly further comprising an annular filter cap having a smaller diameter lower section internal to the filter element and a
5 larger diameter upper section external to and contacting the upper portion of the filter element, the filter cap further comprising a cylindrical opening extending through the cap to receive the valve stem.

7. The device of claim 6 further comprising a nozzle adapter removably attached to the valve body, the nozzle adapter internally receiving the valve seat and positioned to provide a sealing engagement with the lower chamber opening, whereby the filter element can be removed and replaced through the lower chamber opening when the nozzle adapter is detached from the valve body.

8. The device of claim 7 further comprising a cylindrical housing having a lower section extending through the liquid chamber and partially into the nozzle adapter and an upper section positioned proximate an upper opening of the air chamber, the
15 housing enclosing the filter element and having at least one opening through the lower section to provide liquid communication between the liquid chamber and the filter element.

9. The device of claim 8 further comprising an air cylinder attached to the valve
20 body, the air cylinder including an internal piston engaging an upper portion of the valve stem and operative to provide reciprocating vertical movement of the stem within the liquid chamber to open and close the dispensing orifice.

10. A device for dispensing a liquid comprising:

a. an air cylinder comprising an air cylinder body enclosing an air chamber, an air passage extending through the device to the air chamber, and a piston aligned and retained within the air chamber for reciprocating vertical movement within the air chamber in response to movement of air into and out of the air chamber through the air passage;

b. a valve assembly comprising

a valve body including a liquid chamber and a liquid passage into the chamber,

a valve seat in liquid communication with a lower opening of the liquid chamber, the valve seat having a dispensing orifice,

a valve stem comprising a stem lower section vertically aligned and retained inside the liquid chamber, and a stem upper section, the valve stem having a central axis;

c. the valve body attached to the air cylinder body;

d. the stem upper section extending from an upper opening of the liquid chamber;

e. the piston further comprising stem retaining means to mechanically engage the upper section of the stem to allow angular pivoting of the central axis of the stem in response to lateral forces applied to the lower section of the stem during operation of the device.

11. The device of claim 10 wherein the upper section of the stem further comprises an annular stem groove and the stem retaining means comprises a piston cavity internal to the piston and at least one stem lock retained in the piston cavity, the stem lock engaging the annular stem groove or formed as part of the stem inside
5 the piston cavity.

12. The device of claim 10 wherein the upper section of the stem further comprises a shoulder and the stem retaining means comprises a piston cavity internal to the piston, the shoulder being pivotally retained inside the piston cavity.

13. A liquid dispensing device comprising:

a. an air cylinder including an air cylinder body and an internal reciprocating piston;

b. a valve assembly comprising a valve body and a reciprocating valve stem in operative engagement with the piston;

c. the valve body comprising

an upper section,

a lower section

a liquid chamber inside the lower section, the liquid chamber having an upper opening

a liquid passage into the liquid chamber;

d. the upper section of the valve body attached to the air cylinder body;

and

e. the valve body further comprising a notched portion partially separating the upper section of the valve body from the lower section of the valve body above the upper opening of the liquid chamber.

14. A liquid dispensing device comprising:

5 a. valve assembly comprising a valve body, a liquid chamber inside the valve body, and a liquid passage into the liquid chamber, the liquid chamber having an upper opening and a lower opening;

b. a nozzle adapter removably attached to the valve body proximate the lower opening of the liquid chamber,

c. a valve seat retained by the nozzle adapter proximate the lower opening of the liquid chamber, the valve seat including a dispensing orifice in liquid communication with the liquid chamber;

d. a valve stem having a lower section vertically aligned within the liquid chamber and an upper section extending through the upper opening of the liquid chamber, the valve stem adapted for vertical reciprocating movement to open and close the dispensing orifice;

e. a seal assembly comprising
at least one liquid seal engaging the valve body proximate the upper opening
of the liquid chamber, the liquid seal having a central bore providing a
reciprocating sealing contact with the valve stem,

a housing vertically aligned and slidably retained within the liquid chamber, the housing having an internal bore surrounding and retaining the liquid seal; and

f. wherein the seal assembly is removable as a unit through the lower opening of the liquid chamber when the nozzle adapter is detached from the valve body.

15. The device of claim 13, wherein

the housing comprises a lower section extending through the liquid chamber and partially into the nozzle adaptor, an annular upper section positioned to provide a sealing engagement with the valve body proximate the upper opening of the liquid chamber, and

the seal assembly further comprises an O-ring positioned around the upper section of the housing.